

# **Chapter 11**

## **General Morbidity and All-Cause Mortality**

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Table 11.1S Studies on the association between smoking and all-cause mortality

Study	Design/population	Results (rate ratio 95% CI)			Comments
		Current smoker	Former smoker	Never smoker	
Sakata et al. 2012	• 27,311 men and 40,662 women born before 1945 who were atomic bomb survivors or residents of Hiroshima and Nagasaki, Japan	<p>Years of age started smoking</p> <ul style="list-style-type: none"> <li>Men born &lt;1920:           <ul style="list-style-type: none"> <li>&lt;20: 1.66 (1.54–1.79)</li> <li>20–29: 1.42 (1.34–1.51)</li> <li>≥30: 1.17 (1.07–1.29)</li> <li>Unknown: 2.85 (2.48–3.28)</li> <li>All ages: 1.46 (1.38–1.54)</li> </ul> </li> <li>Men born 1920–1945:           <ul style="list-style-type: none"> <li>&lt;20: 2.21 (1.97–2.48)</li> <li>20–29: 1.71 (1.53–1.91)</li> <li>≥30: 1.48 (1.07–2.05)</li> <li>Unknown: 2.04 (1.74–2.39)               <ul style="list-style-type: none"> <li>All ages: 1.89 (1.70–2.10)</li> </ul> </li> </ul> </li> <li>Women born &lt;1920:           <ul style="list-style-type: none"> <li>&lt;20: 1.54 (1.21–1.95)</li> <li>20–29: 1.53 (1.38–1.70)</li> <li>≥30: 1.26 (1.16–1.36)</li> <li>Unknown: 1.78 (1.65–1.91)               <ul style="list-style-type: none"> <li>All ages: 1.51 (1.43–1.58)</li> </ul> </li> </ul> </li> <li>Women born 1920–1945:           <ul style="list-style-type: none"> <li>&lt;20: 2.61 (1.98–3.44)</li> <li>20–29: 2.01 (1.79–2.25)</li> <li>≥30: 1.40 (1.22–1.62)</li> <li>Unknown: 1.94 (1.67–2.27)               <ul style="list-style-type: none"> <li>All ages: 1.81 (1.67–1.96)</li> </ul> </li> </ul> </li> </ul>	<p>Years of age quit smoking</p> <ul style="list-style-type: none"> <li>Men born &lt;1920:           <ul style="list-style-type: none"> <li>&lt;25: 1.19 (0.84–1.68)</li> <li>25–34: 1.13 (0.94–1.36)</li> <li>35–44: 1.09 (0.95–1.24)</li> <li>45–54: 1.11 (1.00–1.22)</li> <li>55–64: 1.23 (1.12–1.34)</li> <li>≥65: 1.45 (1.33–1.59)</li> <li>Unknown: 1.51 (1.28–1.78)</li> </ul> </li> <li>Men born 1920–1945:           <ul style="list-style-type: none"> <li>&lt;25: 0.91 (0.58–1.42)</li> <li>25–34: 0.83 (0.66–1.05)</li> <li>35–44: 1.21 (1.02–1.44)</li> <li>45–54: 1.43 (1.23–1.68)</li> <li>55–64: 1.73 (1.45–2.06)</li> <li>≥65: 1.72 (1.16–2.57)</li> <li>Unknown: 2.14 (1.70–2.69)</li> </ul> </li> <li>Women born &lt;1920:           <ul style="list-style-type: none"> <li>&lt;25: 0.89 (0.29–2.75)</li> <li>25–34: 1.16 (0.81–1.65)</li> <li>35–44: 1.04 (0.80–1.36)</li> <li>45–54: 0.93 (0.78–1.11)</li> <li>55–64: 1.22 (1.06–1.40)</li> <li>≥65: 1.31 (1.15–1.48)</li> <li>Unknown: 1.45 (1.27–1.66)</li> </ul> </li> <li>Women born 1920–1945:           <ul style="list-style-type: none"> <li>&lt;25: 1.54 (0.64–3.70)</li> <li>25–34: 1.21 (0.81–1.81)</li> <li>35–44: 1.27 (0.95–1.70)</li> <li>45–54: 1.59 (1.26–2.00)</li> <li>55–64: 1.49 (1.15–1.92)</li> <li>≥65: 1.94 (1.15–3.29)</li> <li>Unknown: 1.55 (1.23–1.95)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Risk of death increased with younger age of smoking initiation, irrespective of period of birth or gender</li> <li>Quitting smoking at earlier age reduced risk of death</li> </ul>	
					Rate ratios presented for current vs. never smokers and for former vs. never smokers, within strata of age started/quit smoking, period of birth, and gender

Table 11.1S Continued

Study	Design/population	Results (rate ratio 95% CI)				Comments
		Current smoker	Former smoker	Never smoker	Findings	
Thun et al. 2013	<ul style="list-style-type: none"> <li>• CPS-I (1959–1965; 183,060 men, 355,922 women)           <ul style="list-style-type: none"> <li>• Men               <ul style="list-style-type: none"> <li>– CPS-I: 1.76 (1.71–1.81)</li> <li>– CPS-II: 2.33 (2.26–2.40)</li> <li>– Contemporary: 2.80 (2.72–2.88)</li> </ul> </li> <li>• Women               <ul style="list-style-type: none"> <li>– CPS-I: 1.35 (1.30–1.40)</li> <li>– CPS-II: 2.08 (2.02–2.14)</li> <li>– Contemporary: 2.76 (2.69–2.84)</li> </ul> </li> </ul> </li> <li>• CPS-II (1982–1988, 293,592 men, 452,893 women)           <ul style="list-style-type: none"> <li>• Women               <ul style="list-style-type: none"> <li>– CPS-I: 1.33 (1.23–1.43)</li> <li>– CPS-II: 1.33 (1.29–1.37)</li> <li>– Contemporary: 1.45 (1.43–1.48)</li> </ul> </li> </ul> </li> <li>• 5 pooled contemporary cohort studies of NIH-AARP, the ACS CPS-II Nutrition Cohort (a subset of the original CPS-II mortality study), WHI, NHS, and HPFS (2000–2010; 421,702 men, 535,054 women), 55 years of age or older during follow-up</li> </ul>	<ul style="list-style-type: none"> <li>• Men           <ul style="list-style-type: none"> <li>– CPS-I: 1.28 (1.23–1.34)</li> <li>– CPS-II: 1.42 (1.38–1.45)</li> <li>– Contemporary: 1.47 (1.45–1.50)</li> </ul> </li> <li>• Women           <ul style="list-style-type: none"> <li>– CPS-I: 1.33 (1.23–1.43)</li> <li>– CPS-II: 1.33 (1.29–1.37)</li> <li>– Contemporary: 1.45 (1.43–1.48)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Absolute risks of death from smoking continue to increase among female smokers</li> <li>• Increased risks now nearly identical for men and women, as compared with persons who have never smoked</li> </ul>	Adjusted for age, race, and educational level		

Note: **ACS** = American Cancer Society; **CI** = confidence interval; **CPS** = Cancer Prevention Study; **HPFS** = Health Professional Follow-up Study; **NIH-AARP** = National Institutes of Health-AARP; **NHS** = Nurses' Health Study; **WHI** = Women's Health Initiative.

Table 11.2S Studies on the association between smoking and poor general health

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
Johnson and Richter 2002	<ul style="list-style-type: none"> <li>• 7,844 adolescents 12–17 years of age</li> <li>• United States</li> </ul>	<p>Mean self-rated health on a scale of 1 (poor) to 5 (excellent)</p> <ul style="list-style-type: none"> <li>• Total: 4.14</li> <li>- ≥6 days/month: 3.85</li> <li>- 1–5 days/month: 3.98</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 4.26</li> </ul>	<ul style="list-style-type: none"> <li>• Smokers had worse self-rated health than never smokers (<math>p &lt; 0.01</math>)</li> </ul>	Adjusted for gender, age, and family income
Ostbye et al. 2002	<ul style="list-style-type: none"> <li>• Health and Retirement Study (7,845 persons 51–64 years of age)</li> <li>• AHEAD (5,037 persons ≥70 years of age)</li> <li>• Longitudinal studies from 1992/1993–1998</li> <li>• United States</li> </ul>	<p>OR (95% CI) for self-reported poor or fair health</p> <ul style="list-style-type: none"> <li>• 51–64 years of age: <ul style="list-style-type: none"> <li>- Heavy: 2.06 (1.80–2.36)</li> <li>- Light: 1.47 (1.24–1.73)</li> </ul> </li> <li>• ≥70 years of age: <ul style="list-style-type: none"> <li>- 1.55 (1.29–1.87)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Time since quit: <ul style="list-style-type: none"> <li>- &lt;3 years: 1.99 (1.60–2.48)</li> <li>- 3–15 years: 1.28 (1.11–1.48)</li> <li>- &gt;15 years: 1.07 (0.91–1.25)</li> </ul> </li> <li>- 1.13 (1.01–1.27)</li> </ul>	<ul style="list-style-type: none"> <li>• Current smoking—particularly heavy smoking—increases risk of fair or poor health</li> <li>• Former smokers who have quit within the last 15 years also have an increased risk of fair or poor health</li> <li>• Long-term quitters (&gt;15 years) have a risk that's similar to never smokers</li> </ul>	Adjusted for exercise, BMI, alcohol consumption, age, race, gender, marital status, and education
Arday et al. 2003	<ul style="list-style-type: none"> <li>• 134,309 elderly (≥65 years of age) and 8,640 disabled (&lt;65 years of age) Medicare managed care enrollees</li> <li>• Elderly:</li> <ul style="list-style-type: none"> <li>- Daily: 1.53 (1.41–1.66)</li> <li>- Some days: 1.40 (1.21–1.63)</li> </ul> </ul>	<p>OR (95% CI) for fair or poor health</p> <ul style="list-style-type: none"> <li>• Disabled: <ul style="list-style-type: none"> <li>- Daily: 1.58 (1.25–2.00)</li> <li>- Some days: 1.51 (0.97–2.34)</li> </ul> </li> <li>• Elderly: <ul style="list-style-type: none"> <li>- Daily: 1.53 (1.41–1.66)</li> <li>- Some days: 1.40 (1.21–1.63)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Disabled: <ul style="list-style-type: none"> <li>- ≤12 months: 1.41 (0.90–2.20)</li> <li>- &gt;12 months: 1.20 (0.97–1.47)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Among disabled, current daily smokers were more likely than never smokers to report fair or poor health</li> <li>• Among elderly, both current and former smokers were more likely than never smokers to report fair or poor health</li> </ul>	Adjusted for age, gender, race/ethnicity, and education
Strine et al. 2005	<ul style="list-style-type: none"> <li>• BRFSS</li> <li>• 2001–2002</li> <li>• 82,918 respondents</li> <li>• ≥18 years of age</li> <li>• United States</li> </ul>	<p>OR (95% CI) for fair or poor general health</p> <ul style="list-style-type: none"> <li>• Total: 1.7 (1.5–1.9)</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 1.4 (1.3–1.6)</li> </ul>	<ul style="list-style-type: none"> <li>• Current and former smokers were more likely than never smokers to report fair or poor health</li> </ul>	Adjusted for age, gender, race/ethnicity, education, employment status, and marital status

Table 11.2S Continued

Study	Design/population	Results				Comments
		Current smoker	Former smoker	Never smoker	Findings	
McClave et al. 2009	<ul style="list-style-type: none"> <li>• BRFSS</li> <li>• 2006</li> <li>• 17,800 participants in 4 states</li> <li>• ≥18 years of age</li> <li>• United States</li> </ul>	<p>OR (95% CI) for fair or poor general health</p> <ul style="list-style-type: none"> <li>• Total: 1.1 (0.7–1.7)</li> <li>• Nonquitter: 1.0 (ref)</li> <li>– Unsuccessful quitter: 1.3 (0.8–2.1)</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 1.1 (0.7–1.7)</li> </ul>	1.1 (0.7–1.7)	<ul style="list-style-type: none"> <li>• Frequency of fair or poor health did not vary significantly by smoking status</li> </ul>	Adjusted for age, race/ethnicity, gender, education, marital status, employment status, chronic disease, and health care coverage
Caldeira et al. 2012	<ul style="list-style-type: none"> <li>• 1,253 U.S. college students</li> </ul>	<p>Probability of fair or poor health status</p> <ul style="list-style-type: none"> <li>• Total smoked at high level throughout college: 0.28</li> </ul>	<p>Did not smoke during college:</p> <ul style="list-style-type: none"> <li>0.11</li> </ul>	<ul style="list-style-type: none"> <li>• Compared with those who did not smoke during college, those who smoked at a high, stable level were more likely to report their health as fair or poor (<math>p &lt; 0.05</math>)</li> </ul>	<ul style="list-style-type: none"> <li>• Compared with those who did not smoke during college, those who smoked at a high, stable level were more likely to report their health as fair or poor (<math>p &lt; 0.05</math>)</li> </ul>	Adjusted for gender, race, and neighborhood income
Wang et al. 2012	<ul style="list-style-type: none"> <li>• 36,225 adolescents</li> <li>• Mean 15 years of age</li> <li>• Hong Kong</li> </ul>	<p>OR (95% CI) for poor self-rated health</p> <ul style="list-style-type: none"> <li>• Total: 1.52 (1.38–1.67)</li> <li>• Boys: 1.31 (1.13–1.53)</li> <li>• Girls: 1.75 (1.53–2.00)</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 1.43 (1.19–1.71)</li> <li>• Boys: 1.43 (1.12–1.83)</li> <li>• Girls: 1.42 (1.08–1.85)</li> </ul>	1.0 (ref) 1.0 (ref) 1.0 (ref)	<ul style="list-style-type: none"> <li>• Current and former smokers were more likely than never smokers to report their health as fair or poor</li> </ul>	Adjusted for gender, age, parental education, housing type, secondhand smoke exposure, ever drinking, physical activity, illicit drug use, and school clustering effect

Note: **AHEAD** = Asset and Health Dynamics among the Oldest Old Survey; **BMI** = body mass index; **BRFSS** = Behavioral Risk Factor Surveillance System; **CI** = confidence interval; **OR** = odds ratio.

**Table 11.3S** Studies on the association between smoking and relative risk of poor functional status

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
Ostbye et al. 2002	<ul style="list-style-type: none"> <li>• Health and Retirement Study</li> <li>• 7,845 persons 51–64 years of age</li> <li>• United States</li> </ul>	<p>OR (95% CI) for disability (self-reported limited ability to work because of impairment or health problems)</p> <ul style="list-style-type: none"> <li>• Total</li> <li>– Heavy: 2.23 (1.84–2.71)</li> <li>– Light: 1.73 (1.37–2.18)</li> <li>– &lt;3 years: 2.45 (1.81–3.33)</li> <li>– 3–15 years: 1.49 (1.21–1.84)</li> <li>– &gt;15 years: 1.07 (0.84–1.37)</li> </ul>	<p>• Time since quit:</p> <ul style="list-style-type: none"> <li>– &lt;3 years: 2.45 (1.81–3.33)</li> <li>– 3–15 years: 1.49 (1.21–1.84)</li> <li>– &gt;15 years: 1.07 (0.84–1.37)</li> </ul>	1.0 (ref)	<ul style="list-style-type: none"> <li>• Current smokers were more likely than never smokers to report limited ability to work</li> <li>• Former smokers were also at increased risk of limited ability to work, with the exception of long-term (&gt;15 years) quitters</li> </ul>
Atkinson et al. 2005	<ul style="list-style-type: none"> <li>• 558 community-dwelling older women with moderate to severe disability</li> <li>• Mean age at baseline was 78 years</li> <li>• Followed for 3 years</li> <li>• United States</li> </ul>	<p>OR (95% CI) for experiencing both cognitive and physical decline. Physical decline based on walking speed. Mental decline based on MMSE</p> <ul style="list-style-type: none"> <li>• Total: 5.66 (1.49–21.54)</li> <li>• Total: 1.38 (0.48–4.00)</li> </ul>	1.0 (ref)	<ul style="list-style-type: none"> <li>• Compared with never smokers, current smokers had a more than 5-fold increase in risk of cognitive and physical decline</li> <li>• Risk among former smokers was similar to that of never smokers of daily living</li> </ul>	Adjusted for age, race, education, number of diseases, pulmonary disease, hemoglobin, baseline walking speed, baseline MMSE score, baseline instrumental activities of daily living, and baseline activities of daily living
Sulander et al. 2005	<ul style="list-style-type: none"> <li>• 11,793 people between 65–79 years of age</li> <li>• Finland</li> </ul>	<p>OR (95% CI) for worse functional status. Functional status scored as 0–5 (higher score reflecting worse status) based on sum of five activities of daily living: use of stairs, walking outside, bathing, dressing, and eating</p> <ul style="list-style-type: none"> <li>• Men: 2.05 (1.62–2.61)</li> <li>• Women: 1.99 (1.47–2.68)</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 1.26 (1.05–1.52)</li> <li>• Women: 1.67 (1.30–2.16)</li> </ul>	1.0 (ref)	<ul style="list-style-type: none"> <li>• Current and former smokers had worse functional status than never smokers</li> </ul>

Table 11.3S Continued

Study	Design/population	Results				Comments
		Current smoker	Former smoker	Never smoker	Findings	
Myint et al. 2007	<ul style="list-style-type: none"> <li>• EPIC study</li> <li>• 16,678 participating men and women</li> <li>• 40–79 years of age at baseline (1993–1997)</li> </ul>	<p>OR (95% CI) for poor physical functional health (bottom 20% of population)</p> <ul style="list-style-type: none"> <li>• Men: 1.85 (1.49–2.30)</li> <li>• Women: 1.56 (1.30–1.87)</li> </ul> <p>OR (95% CI) for poor mental functional health (bottom 20% of population)</p> <ul style="list-style-type: none"> <li>• Men: 1.38 (1.12–1.70)</li> <li>• Women: 1.77 (1.51–2.07)</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 1.18 (1.02–1.35)</li> <li>• Women: 1.16 (1.03–1.30)</li> </ul>	<ul style="list-style-type: none"> <li>• Current and former smokers have worse physical and mental function than never smokers</li> </ul>		Adjusted for age, BMI, social class, education level, prevalent illness, alcohol intake, and physical activity
Liao et al. 2011	<ul style="list-style-type: none"> <li>• Taiwan Longitudinal Study in Aging</li> <li>• 1989–2003</li> <li>• 3,187 men and women ≥60 years of age without functional disability at baseline</li> </ul>	Hazard ratio (95% CI) for functional disability. Functional disability defined as difficulty taking a bath or walking 200–300 meters independently	<ul style="list-style-type: none"> <li>• Men: 1.18 (1.02–1.35)</li> <li>• Women: 1.16 (1.03–1.30)</li> </ul>	<ul style="list-style-type: none"> <li>• Current and former smokers had a higher risk of functional disability than never smokers</li> </ul>		Adjusted for alcohol, sleep, exercise, gender, marital status, education, and time-varying disease status

Table 11.3S Continued

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
Vogl et al. 2012	<ul style="list-style-type: none"> <li>Health Survey for England data</li> <li>13,241 adults ≥16 years of age</li> <li>2006</li> <li>English general population</li> </ul>	<p>OR for problems with mobility</p> <ul style="list-style-type: none"> <li>Total</li> <li>Heavy: 1.67<sup>a</sup></li> <li>Moderate: 1.55<sup>a</sup></li> <li>Light: 1.13</li> </ul> <p>OR for problems with self-care</p> <ul style="list-style-type: none"> <li>Total</li> <li>Heavy: 1.70<sup>a</sup></li> <li>Moderate: 1.45<sup>a</sup></li> <li>Light: 1.25</li> </ul>	<p>• Total</p> <ul style="list-style-type: none"> <li>Ex-regular: 1.18<sup>a</sup></li> <li>Ex-occasional: 0.99</li> </ul> <p>• Total</p> <ul style="list-style-type: none"> <li>Ex-regular: 1.11</li> <li>Ex-occasional: 0.88</li> </ul>	<p>1.00 (ref)</p> <p>1.00 (ref)</p>	<ul style="list-style-type: none"> <li>Compared with never smokers, current heavy smokers scored worse on each of the 5 measures of health-related quality of life</li> <li>Current moderate smokers scored worse than never smokers on all of the measures except problems with usual activity</li> <li>Ex-regular smokers scored worse than never smokers on problems with mobility, pain/discomfort, and anxiety/depression</li> </ul>
		Odds ratio for problems with usual activity			
		<ul style="list-style-type: none"> <li>Total</li> <li>Heavy: 1.42<sup>a</sup></li> <li>Moderate: 1.37</li> <li>Light: 0.95</li> </ul>	<p>• Total</p> <ul style="list-style-type: none"> <li>Ex-regular: 1.11</li> <li>Ex-occasional: 1.12</li> </ul>	<p>1.00 (ref)</p>	
		Odds ratio for problems with pain/discomfort			
		<ul style="list-style-type: none"> <li>Total</li> <li>Heavy: 1.46<sup>a</sup></li> <li>Moderate: 1.36<sup>a</sup></li> <li>Light: 1.34<sup>a</sup></li> </ul>	<p>• Total</p> <ul style="list-style-type: none"> <li>Ex-regular: 1.28<sup>a</sup></li> <li>Ex-occasional: 1.07</li> </ul>	<p>1.00 (ref)</p>	
		Odds ratio for problems with anxiety/depression			
		<ul style="list-style-type: none"> <li>Total</li> <li>Heavy: 1.86<sup>a</sup></li> <li>Moderate: 1.49<sup>a</sup></li> <li>Light: 1.43<sup>a</sup></li> </ul>	<p>• Total</p> <ul style="list-style-type: none"> <li>Ex-regular: 1.16<sup>a</sup></li> <li>Ex-occasional: 1.11</li> </ul>	<p>1.00 (ref)</p>	

Note: **BMI** = body mass index; **CI** = confidence interval; **EPIC** = European Prospective Investigation into Cancer; **MMSE** = Mini-mental state examination; **OR** = odds ratio.

<sup>a</sup>Indicates p<0.05 relative to never smokers.

**Table 11.4S** Studies on the association between smoking and SF-36 or SF-12 scores<sup>a</sup>

Study	Design/population	Results		Findings	Comments
		Current smoker	Former smoker		
Mulder et al. 2001	• 9,660 men and women 20–59 years of age without a history of tobacco-related chronic disease • The Netherlands	• Total: 51.4 MCS score	• Total: 51.6 MCS score	• PCS was higher among never smokers than among former (p <0.05) and current (p <0.001) smokers • MCS was lower among current smokers than among former and never smokers (p <0.0001)	Adjusted for age, gender, education level, and town
Arday et al. 2003	• 134,309 elderly ( $\geq 65$ years of age) and 8,640 disabled ( $< 65$ years of age) Medicare managed care enrollees • Some days: 41.2	PCS score • Disabled: • Daily: 29.4 • Some days: 27.5 • Elderly • Daily: 40.4 • Some days: 41.2	PCS score • Disabled: • Daily: 29.2 • Some days: 29.6 • Elderly • Daily: 37.3 • Some days: 37.3	• Compared with never smokers, all smoking groups had worse PCS scores (p ≤0.03) • Among disabled, current smokers—but not former smokers—had worse MCS scores than never smokers (p ≤0.01) • Among elderly, current smokers and more recent quitters had worse MCS scores than never smokers (p <0.01)	Adjusted for age, gender, race, education
Borzecki et al. 2005	• 1,242 male veterans • Mean 63 years of age • United States	Regression coefficients for the effect of smoking on PCS score at baseline • Total: -1.40	Regression coefficients for the effect of smoking on MCS score at baseline • Total: -1.52	• Current smokers did not have statistically significantly worse PCS or MCS than never smokers • Former smokers had worse PCS than never smokers (p <0.05) in the cross-sectional analysis	Adjusted for age, marital status, education, employment, living alone, comorbidity, alcohol use, exercise, BMI, seat belt use, and cholesterol screening
		• Total: -0.49	• Total: 0.84	Ref	Ref

Table 11.4S Continued

Study	Design/population	Results			Findings	Comments
		Current smoker	Former smoker	Never smoker		
Laaksonen et al. 2006	<ul style="list-style-type: none"> <li>• 8,970 employees of the city of Helsinki</li> <li>• 40–60 years of age</li> </ul>	<ul style="list-style-type: none"> <li>• Men</li> <li>– Heavy: 48.9</li> <li>– Moderate: 50.1</li> <li>• Women</li> <li>– Heavy: 47.8</li> <li>– Moderate: 48.8</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 50.5</li> <li>• Women: 48.6</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 50.7</li> <li>• Women: 48.6</li> </ul>	<ul style="list-style-type: none"> <li>• Heavy current smokers had worse PCS and MCS than never smokers</li> <li>• Former smokers and never smokers had similar PCS and MCS</li> </ul>	Adjusted for age and occupational class
Strandberg et al. 2008	<ul style="list-style-type: none"> <li>• 26-year follow-up study of 1,658 White men</li> <li>• Finland</li> </ul>	<ul style="list-style-type: none"> <li>• Men</li> <li>– Heavy: 50.3</li> <li>– Moderate: 50.1</li> <li>• Women</li> <li>– Heavy: 49.4</li> <li>– Moderate: 51.4</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 52.1</li> <li>• Women: 51.8</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 52.0</li> <li>• Women: 52.1</li> </ul>	<ul style="list-style-type: none"> <li>• After 26 years of follow-up, heavy smokers had worse PCS than never smokers</li> </ul>	Age-adjusted
Sarna et al. 2008	<ul style="list-style-type: none"> <li>• Nurses' Health Study cohorts</li> <li>• 158,736 women between 29 and 71 years of age</li> </ul>	<ul style="list-style-type: none"> <li>• Total: -0.55 (0.06)</li> <li>• Total: -0.08 (0.05)</li> </ul>	<ul style="list-style-type: none"> <li>• Ref</li> </ul>	<ul style="list-style-type: none"> <li>• Current smokers had worse PCS and MCS than never smokers (<math>p &lt; 0.001</math>)</li> <li>• Former smokers had worse MCS than never smokers (<math>p &lt; 0.001</math>)</li> </ul>	<ul style="list-style-type: none"> <li>• Current smokers had worse PCS and MCS than never smokers (<math>p &lt; 0.001</math>)</li> <li>• Former smokers had worse MCS than never smokers (<math>p &lt; 0.001</math>)</li> </ul>	Adjusted for age, BMI, physical activity, living alone, and comorbidity
Pisinger et al. 2009	<ul style="list-style-type: none"> <li>• 9,322 men and women between 30 and 60 years of age</li> <li>• Denmark</li> </ul>	<ul style="list-style-type: none"> <li>• Total: -2.0 (0.07)</li> <li>• Total: -0.32 (0.05)</li> <li>• Ref</li> </ul>		<ul style="list-style-type: none"> <li>• Smokers had worse PCS and MCS than never smokers (<math>p &lt; 0.001</math>)</li> </ul>	<ul style="list-style-type: none"> <li>• Smokers had worse PCS and MCS than never smokers (<math>p &lt; 0.001</math>)</li> </ul>	Adjusted for gender, age, employment status, and length of vocational training

Note: BMI = body mass index; MCS = mental component summary score; PCS = physical component summary score; SE = standard error.

<sup>a</sup>Measures of functional health and well-being; higher scores indicate better function.

Table 11.5S Studies on the association between smoking and other measures of health and function

Study	Design/population	Results				Comments
		Current smoker	Former smoker	Never smoker	Findings	
Ostbye et al. 2002	<ul style="list-style-type: none"> <li>Health and Retirement Study (845 persons 51–64 years of age)</li> <li>AHEAD (5,037 persons ≥70 years of age)</li> <li>Longitudinal studies from 1992/1993–1998</li> <li>United States</li> </ul>	<p>OR (95% CI) for difficulty walking several blocks</p> <ul style="list-style-type: none"> <li>• 51–64 years of age <ul style="list-style-type: none"> <li>– Heavy: 2.37 (2.05–2.74)</li> <li>– Light: 1.68 (1.41–2.00)</li> </ul> </li> <li>• ≥70 years of age: <ul style="list-style-type: none"> <li>– 2.06 (1.69–2.49)</li> <li>– &gt;15 years: 1.09 (0.93–1.29)</li> <li>– ≥70 years of age: 1.30 (1.15–1.48)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Time since quit: &lt;3 years: 2.08 (1.65–2.62)</li> <li>– 3–15 years: 1.34 (1.16–1.56)</li> <li>– &gt;15 years: 1.09 (0.93–1.29)</li> <li>– ≥70 years of age: 1.30 (1.15–1.48)</li> </ul>	<ul style="list-style-type: none"> <li>• Current smokers were more likely than never smokers to have difficulty walking a short distance</li> <li>• Former smokers were also more likely to report difficulty, although the effect varied with time since quitting; long-term quitters had a risk that was similar to never smokers</li> </ul>	Adjusted for exercise, BMI, alcohol consumption, age, race, gender, marital status, and education	
Woods et al. 2005	<ul style="list-style-type: none"> <li>28,181 WHI observational study participants</li> <li>Women 65–79 years of age and free of frailty at baseline</li> <li>United States</li> <li>3 years of follow-up</li> </ul>	<p>OR (95% CI) for incident frailty by baseline smoking status Frailty defined as a score of 3 or higher based on the following: poor-self reported physical function (2 points), exhaustion (1 point), low physical activity (1 point), and unintentional weight loss (1 point)</p> <ul style="list-style-type: none"> <li>• Total: 2.90 (2.35–3.57)</li> <li>• Total: 1.12 (1.02–1.23)</li> <li>• Total: 1.0 (ref)</li> </ul>		<ul style="list-style-type: none"> <li>• Current and former smokers were more likely than never smokers to develop frailty</li> </ul>	Adjusted for age, income, education, ethnicity, BMI, alcohol, hormone therapy, self-reported health, disability, living alone, and comorbid conditions	
Heikkinen et al. 2008	<ul style="list-style-type: none"> <li>8,028 persons ≥30 years of age</li> <li>Mean: 51 years of age among men and 54 among women</li> <li>Survey conducted 2000–2001</li> <li>Finland</li> </ul>	<p>Overall quality of life Respondents were asked to rate on a scale of 0 (worst) to 10 (best) how good their present life as a whole had been within the last 30 days</p> <ul style="list-style-type: none"> <li>• Men daily smokers: 7.35</li> <li>• Women daily smokers: 7.58</li> </ul>	<ul style="list-style-type: none"> <li>• Men daily smokers: 7.66</li> <li>• Women daily smokers: 7.67</li> </ul>	<ul style="list-style-type: none"> <li>• Daily smokers reported worse overall quality of life than never smokers among both men (<math>p &lt; 0.001</math>) and women (<math>p = 0.004</math>)</li> <li>• Former smokers and never smokers had similar quality of life</li> </ul>	Adjusted for age, education, and health-related quality of life	
McClave et al. 2009	<ul style="list-style-type: none"> <li>BRFSS</li> <li>2006</li> <li>17,800 participants in 4 states</li> <li>≥18 years of age</li> <li>United States</li> </ul>	<p>OR (95% CI) for life dissatisfaction</p> <ul style="list-style-type: none"> <li>• Total: 0.5 (0.3–0.9)</li> <li>– Nonquitte: 1.0 (ref)</li> <li>– Unsuccessful quitter: 0.7 (0.4–1.3)</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 0.4 (0.2–0.7)</li> </ul>	<ul style="list-style-type: none"> <li>• Compared with current smokers who have not recently tried to quit, former smokers and never smokers are less likely to report life dissatisfaction</li> </ul>	Adjusted for age, race/ethnicity, gender, education, marital status, employment status, chronic disease, and health care coverage	

Table 11.5S Continued

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
Hardy et al. 2010	<ul style="list-style-type: none"> <li>• 9,563 community-dwelling Medicare beneficiaries ≥65 years of age</li> </ul>	<ul style="list-style-type: none"> <li>• Current smokers were more likely than never smokers to have difficulty walking <math>\frac{1}{4}</math> mile or to be unable to walk <math>\frac{1}{4}</math> mile</li> <li>• Former smokers did not differ statistically significantly from never smokers in their ability to walk a short distance</li> </ul>			Adjusted for age, gender, race, marital status, income, education, insurance status, chronic conditions, and BMI
Piper et al. 2012	<ul style="list-style-type: none"> <li>• 1,504 participants in a smoking cessation trial</li> <li>• Average 45 years of age</li> <li>• United States</li> </ul>	<ul style="list-style-type: none"> <li>• During 3 years of follow-up, successful quitters experienced less of a decline in global quality of life than continuing smokers</li> <li>• Mean (SD) change in QOLI total at 3 years was -0.24 (1.40) in quitters and -0.47 (1.40) in continuing smokers</li> </ul>		<ul style="list-style-type: none"> <li>• Current smokers were more likely than never smokers to have difficulty walking a short distance or to be unable to walk a short distance (<math>p &lt; 0.05</math>)</li> <li>• Smokers who quit reported better quality of life than smokers who did not quit (<math>p = 0.02</math>)</li> </ul>	Adjusted for age, gender, race, marital status, income, education, insurance status, chronic conditions, and BMI
Sabia et al. 2012	<ul style="list-style-type: none"> <li>• Whitehall II Study</li> <li>• 5,100 men and women 42–63 years of age at baseline</li> <li>• Followed for a median of 16.3 years</li> <li>• Free of cancer, coronary artery disease, and stroke at baseline</li> </ul>	<ul style="list-style-type: none"> <li>• OR (95% CI) for successful aging</li> <li>• Successful aging defined as good cognitive, physical, respiratory, and cardiovascular functioning, and absence of disability, mental health problems, and chronic disease</li> <li>• Ever-smokers formed the reference group</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 1.29 (1.11–1.49)</li> </ul>	<ul style="list-style-type: none"> <li>• Never smokers were more likely than ever smokers to experience successful aging</li> </ul>	Adjusted for alcohol consumption, physical activity, daily consumption of fruits and vegetables, age, gender, education, and marital status

Note: **AHEAD** = Asset and Health Dynamics among the Oldest Old Survey; **BMI** = body mass index; **BRFSS** = Behavioral Risk Factor Surveillance System; **CI** = confidence interval; **MCS** = mental component summary score; **OR** = odds ratio; **QOLI** = Quality of Life Inventory; **SD** = standard deviation; **WHI** = Women's Health Initiative.

**Table 11.6S** Studies on the association between smoking and hospitalizations

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
Robbins et al. 2000	<ul style="list-style-type: none"> <li>• 87,991 men and women serving on active duty in the U.S. Army during 1987–1998</li> <li>• Average at baseline was 28.5 years of age</li> </ul>	<p>Rate ratio (95% CI) for hospitalization not due to injury or pregnancy</p> <ul style="list-style-type: none"> <li>• Men: 1.30 (1.24–1.35)</li> <li>• Women: 1.25 (1.14–1.37)</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 1.20 (1.14–1.26)</li> <li>• Women: 1.13 (1.01–1.26)</li> </ul>	<ul style="list-style-type: none"> <li>• Among both men and women, current and former smokers were more likely to be hospitalized than never smokers</li> </ul>	Adjusted for age, race, military rank, alcohol consumption, exercise frequency, and overweight
Johnson and Richter 2002	<ul style="list-style-type: none"> <li>• 7,844 adolescents 12–17 years of age</li> <li>• United States</li> </ul>	<p>Mean number of overnight hospital stays</p> <ul style="list-style-type: none"> <li>• Total: 0.05</li> <li>– 6 or more days/month: 0.22</li> <li>– 1–5 days/month: 0.04</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 0.05</li> </ul>	<ul style="list-style-type: none"> <li>• Frequent smokers reported more overnight hospital stays than less frequent smokers, former smokers, or never smokers (<math>p &lt; 0.01</math>)</li> </ul>	Adjusted for gender, age, and family income
Ostbye et al. 2002	<ul style="list-style-type: none"> <li>• Health and Retirement Study (7,845 persons 51–64 years of age)</li> <li>• AHEAD (5,037 persons ≥70 years of age)</li> <li>• Longitudinal studies from 1992/1993–1998</li> <li>• United States</li> </ul>	<p>OR (95% CI) for hospitalization in previous year</p> <ul style="list-style-type: none"> <li>• 51–64 years of age <ul style="list-style-type: none"> <li>– Heavy: 1.41 (1.24–1.59)</li> <li>– Light: 1.35 (1.16–1.56)</li> </ul> </li> <li>• ≥70 years of age: <ul style="list-style-type: none"> <li>– 1.28 (1.08–1.52)</li> </ul> </li> </ul>	<p>Time since quit:</p> <ul style="list-style-type: none"> <li>– &lt;3 years: 1.46 (1.20–1.78)</li> <li>– 3–15 years: 1.22 (1.08–1.38)</li> <li>– &gt;15 years: 0.96 (0.85–1.09)</li> </ul>	<ul style="list-style-type: none"> <li>• Current smokers and more recent quitters were more likely to be hospitalized than never smokers</li> <li>• Long-term quitters (&gt;15 years) and never smokers had a similar likelihood of hospitalization</li> </ul>	Adjusted for exercise, BMI, alcohol consumption, age, race, gender, marital status, and education
Kahende et al. 2009	<ul style="list-style-type: none"> <li>• NHANES</li> <li>• 1999–2004</li> <li>• 15,332 adults ≥18 years of age</li> <li>• United States</li> </ul>	OR for a hospitalization within the last year	<ul style="list-style-type: none"> <li>• Total: 1.20 (1.06–1.37)</li> </ul>	<ul style="list-style-type: none"> <li>• Total: <ul style="list-style-type: none"> <li>– &lt;2 years since quit: 2.49 (1.86–3.34)</li> <li>– 2–4 years since quit: 1.39 (0.98–1.97)</li> <li>– 5–9 years since quit: 1.17 (0.86–1.59)</li> <li>– ≥10 years since quit: 1.22 (1.02–1.46)</li> </ul> </li> </ul>	Adjusted for gender, race/ethnicity, age, education, poverty level, and health insurance

Table 11.6S Continued

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
Woodruff et al. 2010	<ul style="list-style-type: none"> <li>• 5,503 female U.S. Navy recruits</li> <li>• Mean 19.7 years of age at entry</li> </ul>	<ul style="list-style-type: none"> <li>Percent hospitalized; excludes pregnancy-related hospitalizations</li> <li>• Daily smoker: 13</li> </ul>	<ul style="list-style-type: none"> <li>• Former or nondaily smoker: 12</li> </ul>	<ul style="list-style-type: none"> <li>• Never smoker: 14</li> </ul>	<ul style="list-style-type: none"> <li>• Likelihood of hospitalization did not vary by smoking status</li> <li>• Duration of hospitalization was longest among current smokers</li> </ul>
		Average duration of hospitalization (days)			
		<ul style="list-style-type: none"> <li>• Daily smoker: 5.7</li> </ul>	<ul style="list-style-type: none"> <li>• Former or nondaily smoker: 5.1</li> </ul>	<ul style="list-style-type: none"> <li>• Never smoker: 5.2</li> </ul>	

Note: **AHEAD** = Asset and Health Dynamics among the Oldest Old Survey; **BMI** = body mass index; **CI** = confidence interval; **NHANES** = National Health and Nutrition Examination Survey; **OR** = odds ratio.

**Table 11.7S** Studies on the association between smoking and outpatient visits

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
Borzecki et al. 2005	• 1,397 male veterans • United States	Regression coefficient for the effect of smoking on physician visits Total: -0.30	Total: -0.05	Ref	• Current smokers had fewer outpatient visits than never smokers ( $p < 0.05$ ) Adjusted for age, marital status, education, employment, live alone, other insurance, disability, comorbidity, alcohol, exercise, BMI, seat belt use, and cholesterol screening
Kahende et al. 2009	• NHANES • 1999–2004 • 15,332 adults $\geq 18$ years of age • United States	OR for at least 1 outpatient visit within the last year • Total: 0.94 (0.81–1.13)	• <2 years since quit: 1.0 (ref) 1.75 (1.15–2.65) • 2–4 years since quit: 1.15 (0.76–1.75) • 5–9 years since quit: 1.47 (0.90–2.40) • ≥10 years since quit: 1.75 (1.42–2.14)	• <2 years since quit: 1.0 (ref) similar in current and never smokers • Current smokers and former smokers were more likely than never smokers to have multiple ( $\geq 4$ ) outpatient visits • Multiple outpatient visits were most common among recent quitters	• The frequency of at least 1 outpatient visit was similar in current and never smokers • Current smokers and former smokers were more likely than never smokers to have multiple ( $\geq 4$ ) outpatient visits • Multiple outpatient visits were most common among recent quitters Adjusted for gender, race/ethnicity, age, education, poverty level, and health insurance
		OR for 4 or more outpatient visits within the last year			
		• Total: 1.18 (1.06–1.33)	• <2 years since quit: 1.0 (ref) 1.65 (1.29–2.12) • 2–4 years since quit: 1.59 (1.17–2.18) • 5–9 years since quit: 1.34 (1.02–1.74) • ≥10 years since quit: 1.17 (1.04–1.32)		

Note: **BMI** = body mass index; **NHANES** = National Health and Nutrition Examination Survey; **OR** = odds ratio.

**Table 11.8S** Studies on the association between smoking and nursing home stays

Study	Design/population	Results		Comments
		Current smoker	Former smoker	
Ostbye et al. 2002	<ul style="list-style-type: none"> <li>AHEAD (5,037 persons ≥70 years of age)</li> <li>Longitudinal study from 1993–1998</li> <li>United States</li> </ul>	<p>OR (95% CI) for stay in a nursing home, convalescent home, or other long-term care health facility in the previous year</p> <ul style="list-style-type: none"> <li>≥70 years of age: – 1.68 (1.08–2.63)</li> <li>&gt;70 years of age: – 1.16 (0.85–1.58)</li> </ul>	<ul style="list-style-type: none"> <li>≥70 years of age: 1.0 (ref)</li> </ul>	<ul style="list-style-type: none"> <li>Current smokers were more likely than never smokers to have a stay in a nursing home, convalescent home, or other long-term care facility</li> </ul>
Vaileyeva et al. 2006	<ul style="list-style-type: none"> <li>NHANES I Epidemiologic Follow-up Study (NHEFS)</li> <li>6,462 people who were 45–74 years of age at baseline (1971–1975)</li> <li>Followed until 1992</li> </ul>	<p>RR (95% CI) of a nursing home admission</p> <ul style="list-style-type: none"> <li>45–65 years of age at baseline: – 1.56 (1.123–1.99)</li> <li>65–74 years of age at baseline: – 1.32 (1.08–1.61)</li> </ul>	<p>Reference group did not smoke at baseline</p> <p>Reference group did not smoke at baseline</p>	<ul style="list-style-type: none"> <li>Current smokers were more likely than people who did not smoke at baseline to be admitted to a nursing home</li> </ul>

Note: **AHEAD** = Asset and Health Dynamics among the Oldest Old Survey; **BMI** = body mass index; **CI** = confidence interval; **NHANES** = National Health and Nutrition Examination Survey; **OR** = odds ratio; **RR** = relative risk.

Table 11.9S Studies on the association between smoking and costs

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
CBO 2012	• Medical Expenditure Panel Survey Data for 2000–2008 from the • 1998–2007 from the National Health Interview Survey • ≥18 years of age	Annual per capita spending on health care (in 2008 dollars) for former smokers, by time since quit	<ul style="list-style-type: none"> <li>• 18–24 years of age: 2,010</li> <li>• 25–44 years of age: 2,850</li> <li>• 45–64 years of age: 5,540</li> <li>• 65–74 years of age: 7,940</li> <li>• ≥75 years of age: 8,750</li> </ul>	<ul style="list-style-type: none"> <li>• 18–24 years of age: 1,870</li> <li>– &lt;5 years: 2,000</li> <li>– 5–14 years: NA</li> <li>– ≥15 years: NA</li> <li>• 25–44 years of age: 2,570</li> <li>– &lt;5 years: 3,090</li> <li>– 5–14 years: 2,920</li> <li>– ≥15 years: 3,330</li> <li>• 45–64 years of age: 5,040</li> <li>– &lt;5 years: 7,650</li> <li>– 5–14 years: 6,580</li> <li>– ≥15 years: 6,290</li> <li>• 65–74 years of age: 7,790</li> <li>– &lt;5 years: 11,250</li> <li>– 5–14 years: 9,760</li> <li>– ≥15 years: 9,330</li> <li>• ≥75 years of age:</li> <li>– &lt;5 years: 15,530</li> <li>– 5–14 years: 12,280</li> <li>– ≥15 years: 11,770</li> </ul>	<ul style="list-style-type: none"> <li>• Spending tended to be highest among former smokers followed by current smokers.</li> <li>• Never smokers had the lowest spending in each age group except the oldest</li> </ul>

Note: CBO = Congressional Budget Office; NA = not available.

**Table 11.10S Annual per capita spending on health care, by smoking status and age group (2008 dollars\*)**

	<b>18–24 years</b>	<b>25–44 years</b>	<b>45–64 years</b>	<b>65–74 years</b>	<b>≥75 years</b>
People who have never smoked	1,870	2,570	5,040	7,790	9,810
Current or former smokers	2,010	2,940	6,170	9,230	11,580
Current smokers	2,010	2,850	5,540	7,940	8,750
Former smokers					
For <5 years	2,000	3,090	7,650	11,250	15,530
For 5–14 years	n.a.	2,920	6,580	9,760	12,280
For ≥15 years	n.a.	3,330	6,290	9,330	11,770

Source: Congressional Budget Office 2012.

Note: n.a. = not available (because of a lack of data to produce precise estimates). Based on data for 2000 to 2008 from the Medical Expenditure Panel Survey and for 1998 to 2007 from the National Health Interview Survey.

\*The numbers shown here are rounded to the nearest \$10.

**Table 11.11S Studies on the association between smoking and workplace absenteeism (days absent)\***

Study	Design/population	Results			Comments
		Current smoker	Former smoker	Never smoker	
Halpern et al. 2001	<ul style="list-style-type: none"> <li>• 292 U.S. airline employees</li> <li>• Mean ranged from 37 years of age among never smokers to 44 years of age among former smokers</li> </ul>	Mean (SD) absenteeism days caused by sickness during 4-month study period			<ul style="list-style-type: none"> <li>• Absenteeism varied by smoking status (<math>p = 0.0001</math>)</li> </ul>
Tsai et al. 2003	<ul style="list-style-type: none"> <li>• 2,203 employees of a U.S. chemical and refinery facility</li> <li>• Ages ranged from &lt;30 to &gt;60</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 3.99 (4.86)</li> <li>• Total: 2.40 (3.54)</li> <li>• Total: 1.33 (2.20)</li> </ul>	Mean number of days lost per employee/year		<ul style="list-style-type: none"> <li>• Current smokers missed more days than never smokers (<math>p</math>-value NR)</li> </ul>
Tsai et al. 2005	<ul style="list-style-type: none"> <li>• 2,550 regular employees at U.S. petrochemical facility</li> <li>• Average 46 years of age at end of study</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 6.4</li> <li>• Total: 4.8</li> <li>• Total: 3.5</li> </ul>	Mean number of days lost per employee/year		<ul style="list-style-type: none"> <li>• Among both men and women, current smokers lost almost twice as many days as never smokers (<math>p &lt; 0.05</math>)</li> </ul>
			<ul style="list-style-type: none"> <li>• Men: 13.3</li> <li>• Women: 23.3</li> <li>• Total: 14.3</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 8.7</li> <li>• Women: 12.5</li> <li>• Time since quitting</li> </ul>	<ul style="list-style-type: none"> <li>• Men: 7.0</li> <li>• Women: 12.3</li> <li>• Total: 7.6</li> </ul>
			<ul style="list-style-type: none"> <li>– 1–9 years: 11.0</li> <li>– 10–19 years: 8.8</li> <li>– ≥20 years: 7.9</li> </ul>		

Note: **NR** = not reported; **SD** = standard deviation.

\*Absenteeism includes any absence during a specified time period, any short-term absence, any long-term absence, or total days lost.

Table 11.12S Studies on the association between smoking and relative risk (RR) of workplace absenteeism\*

Study	Design/population	Results		Comments
		Current smoker	Former smoker	
Morikawa et al. 2004	<ul style="list-style-type: none"> <li>• 2,504 male Japanese factory workers, 35–55 years of age</li> <li>• 6,290 male British civil service workers, 35–55 years of age</li> </ul>	HR (95% CI) for first long-term (>7 days) sickness absence <ul style="list-style-type: none"> <li>• Japan: 1.43 (1.17–1.75)</li> <li>• Britain: 1.51 (1.35–1.67)</li> </ul>	<ul style="list-style-type: none"> <li>• Japan: 1.39 (1.07–1.80)</li> <li>• Britain: 1.11 (1.02–1.21)</li> </ul>	<ul style="list-style-type: none"> <li>• Current and former smokers were each more likely than never smokers to have a long-term sickness absence</li> </ul>
Sindelar et al. 2005	<ul style="list-style-type: none"> <li>• 383,778 full-time U.S. workers</li> <li>• 18–64 years of age</li> </ul>	OR for absence in the last week	<ul style="list-style-type: none"> <li>• Current and former smokers were each more likely than never smokers to have an absence (<math>p = 0.000</math> for each group)</li> <li>• Although risk of an absence appeared to be highest among recent quitters, each group of former smokers was more likely than never smokers to have an absence (<math>p &lt; 0.05</math> for each group)</li> </ul>	Adjusted for age, education, race, ethnicity, marital status, number of children, occupation, industry, metropolitan statistical area, state, and month and year
Labriola et al. 2006	<ul style="list-style-type: none"> <li>• 3,792 Danish employees</li> <li>• 18–64 years of age at start of study</li> </ul>	OR for >6 days of absence of previous year <ul style="list-style-type: none"> <li>• Total: 1.61 (1.32–1.96)</li> <li>• Total: 1.32 (1.03–1.68)</li> </ul>	<ul style="list-style-type: none"> <li>• Current and former smokers were each more likely than never smokers to have more than 6 days of absence in the previous year</li> </ul>	Adjusted for age, gender, health status, BMI, and employer and job characteristics
Christensen et al. 2007	<ul style="list-style-type: none"> <li>• 5,020 Danish employees</li> <li>• 18–69 years of age</li> </ul>	HR for long-term sickness absence (8 consecutive weeks) <ul style="list-style-type: none"> <li>• Men</li> <li>– ≥15 cigarettes: 1.55 (1.00–2.40)</li> <li>– &lt;15 cigarettes: 0.92 (0.50–1.73)</li> </ul>	<ul style="list-style-type: none"> <li>• Among current smokers, only heavy smoking significantly increased risk of long-term absence</li> <li>• Former smoking increased risk of a long-term absence among women only</li> </ul>	Adjusted for age, family status, SES, education, work environment, and diagnosed disease; adjustment for diagnosed disease may lead to underestimation of the smoking effect

Table 11.12S Continued

Study	Design/population	Current smoker	Results		Comments
			Former smoker	Never smoker	
Laaksonen et al. 2009	<ul style="list-style-type: none"> <li>• 5,470 female and 1,464 male Finnish city employees</li> <li>• 40–60 years of age</li> </ul>	<ul style="list-style-type: none"> <li>• Men <ul style="list-style-type: none"> <li>- &gt;20 cigarettes: 1.71 (1.39–2.11)</li> <li>- ≤20 cigarettes: 1.63 (1.34–1.98)</li> </ul> </li> <li>• Women <ul style="list-style-type: none"> <li>- &gt;20 cigarettes: 1.50 (1.37–1.64)</li> <li>- ≤20 cigarettes: 1.23 (1.13–1.34)</li> </ul> </li> </ul>	<p>RR for 1–3 day sickness absence</p> <ul style="list-style-type: none"> <li>• Men: 1.12 (0.94 to 1.33) 1.0 (ref)</li> <li>• Women: 1.18 (1.10–1.27) 1.0 (ref)</li> </ul> <p>RR for ≥4 day sickness absence</p> <ul style="list-style-type: none"> <li>• Men <ul style="list-style-type: none"> <li>- &gt;20 cigarettes: 1.66 (1.31–2.10)</li> <li>- ≤20 cigarettes: 1.23 (0.96–1.57)</li> </ul> </li> <li>• Women: <ul style="list-style-type: none"> <li>- &gt;20 cigarettes: 1.49 (1.34–1.65)</li> <li>- ≤20 cigarettes: 1.32 (1.20–1.46)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Heavy current smoking increased the risk of both short- and longer-term absences in men and women</li> <li>• Lighter current smoking was linked with short-term absences in women, and with longer-term absences in men and women</li> <li>• The increase in absences among former smokers was only statistically significant in women</li> </ul>	Adjusted for age and occupational class

Note: **BMI** = body mass index; **CI** = confidence interval; **HR** = hazard ratio; **OR** = odds ratio; **SES** = socioeconomic status.

\*Absenteeism includes any absence during a specified time period, any short-term absence, any long-term absence, or total days lost.